

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-029537

(43)Date of publication of application : 05.02.1993

(51)Int.Cl. H01L 25/065  
H01L 25/07  
H01L 25/18

(21)Application number : 03-179719 (71)Applicant : FUJITSU LTD

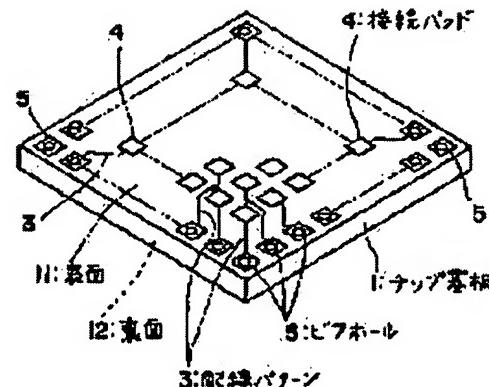
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## (54) SEMICONDUCTOR MODULE STRUCTURE

### (57)Abstract:

**PURPOSE:** To reduce mounting area and realize high density mounting, by unnecessary module substrates for mounting chip substrates, and vertically stacking the chip substrates, concerning semiconductor module structure constituted by stacking a plurality of chip substrates on which semiconductor circuits are formed.

**CONSTITUTION:** Wiring patterns 3 and connection pads 4 are formed on the surface 11 and the rear 12 of a chip substrates 1 on which semiconductor circuits are formed. The wiring pattern on the surface and the wiring pattern 3 on the rear are electrically connected through via holes 5. A plurality of chip substrates 1 are vertically stacked by using the connection pads 4.



## LEGAL STATUS

[Date of request for examination] 10.06.1998

[Date of sending the examiner's decision of rejection] 31.08.1999

[Kind of final disposal of application other than the examiner's decision of rejection or

[application converted registration]

[Date of final disposal for application]

[Patent number] 3016910

[Date of registration] 24.12.1999

[Number of appeal against examiner's  
decision of rejection] 11-15319

[Date of requesting appeal against examiner's decision of rejection] 29.09.1999

[Date of extinction of right]

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

[Industrial Application] This invention carries out the modularization of two or more semiconductor chips with which the semiconductor circuit was formed, and relates to the semi-conductor module structure mounted in high density.

[0002] The wiring substrate which arranges between semiconductor chips superficially in order to connect and carry out the modularization of two or more semiconductor chips through a wiring substrate, although mounting in high density on the mother board of electronic equipment by carrying two or more semiconductor chips on one wiring substrate, and carrying out a modularization is performed for the miniaturization of electronic equipment and advanced features cannot be made not much small in recent years, but the semi-conductor module structure which can mount a semiconductor chip in high density more is searched for.

**[0003]**

[Description of the Prior Art] Conventionally, as semi-conductor module structure, as shown in drawing 5, on the module substrate 10 which prints a circuit pattern on resin, a ceramic base material, etc., and becomes them, on the silicon substrate, it connected by solder Bengbu, phone DIN GUWAIYIA, etc., two or more semiconductor chips 20 which come to form a semiconductor circuit were carried, the semiconductor chip 20 was protected on the seal cap 30 or the resin coat, and the semi-conductor module was constituted. And on a mother board 40, it connects with the external connection lead 110 formed in the module substrate 10.

**[0004]**

[Problem(s) to be Solved by the Invention] However, in the conventional semi-conductor module structure, the semiconductor chip 20 has been superficially arranged on the module substrate 10, and since it connects with the circuit pattern on which between semiconductor chips 20 was printed on the module substrate 10, respectively, there were semiconductor chips 20 and 20 and a fault of -- that the loading section and the formation section of a circuit pattern were required on the module substrate 10, and could not make area of the module substrate 10 sufficiently small.

[0005] Without being made that the above fault should be canceled and arranging two or more semiconductor chips superficially on a module substrate, this invention makes a component-side product small, and aims at offering small and high-density semi-conductor module structure.

**[0006]**

[Means for Solving the Problem] If this invention is explained based on drawing 1 thru/or drawing 3 corresponding to an example, the circuit pattern 3 and the connection pad 4 will be formed in the front face 11 and rear face 12 of the chip substrate 1 in which the semiconductor circuit 2 was formed, respectively. Furthermore, the beer hall 5 which penetrates between the table rear face 11 and 12 to the chip substrate 1, and connects the circuit patterns 3 and 3 on the rear face of a table is formed. And on the connection pad 4 by the side of the front face of two or more of said chip substrates 1, in piles, it connects with multistage and the connection pad 42 by the side of the rear face of the chip substrate 1 of

an upper case is formed.

[0007]

[Function] Since the circuit patterns 3 and 3 and the connection pads 4 and 4 on the rear face of a table are connected in this invention based on the above-mentioned configuration by the table rear face 11 of the chip substrate 1, and the beer hall 5 which penetrates between 12, Since a semi-conductor module can be constituted by accumulating two or more chip substrates 1 up and down, and connecting the surface section connection pad 4 by the side of the lower berth, and the rear-face section connection pad 4 by the side of the upper case accumulated with solder etc., By the wiring substrate for carrying out the modularization of the semiconductor chip and connecting becoming unnecessary, and putting up and down, the component-side product to a mother board can be made into the magnitude of one chip substrate, the miniaturization of equipment can be attained, and densification becomes possible.

[0008]

[Example] Hereafter, the desirable example of this invention is explained to a detail based on an accompanying drawing. Drawing 1 and drawing 2 show the chip substrate 1 of the semiconductor device which constitutes the semi-conductor module of this invention, and drawing 3 shows two or more chip substrates 1 and 1 and the semi-conductor module A which accumulated -- on the mother board 6 multistage, and was formed.

[0009] As shown in drawing 1, the chip substrate 1 is a silicon substrate which forms a semiconductor circuit 2, and the semiconductor circuit 2 is formed in the front face 11. And the beer hall 5 which makes the chip substrate 1 penetrate and flow through a front face 11 and a rear face 12 is formed.

[0010] The connection pads 4 and 4 are formed in the location which corresponds to the table rear faces 11 and 12 of the chip substrate 1, respectively, and the circuit pattern 3 is formed so that a semiconductor circuit 2 and the connection pad 4 may be connected. And the circuit patterns 3 and 3 formed in the table rear faces 11 and 12, respectively have flowed by the beer hall 5, as shown in drawing 2.

[0011] And two or more chip substrates 1 are carried on a mother board 6 in piles, as shown in drawing 3, and the connection pad 4 currently formed in the rear face 12 of the chip substrate 1 of the bottom is fixed to the connection pad 61 of a mother board 6 with solder 7, electric conduction adhesives, etc. And the rear-face side connection pad 42 of the chip substrate 1 of an upper case is similarly fixed to the connection pad 4 by the side of the front face of the chip substrate 1, and it is put upon multistage, and it is carried so that the whole may be protected by the resin coating 8.

[0012] next, when the production process of the chip substrate 1 is explained, it is first shown in drawing 4 (a) -- as -- a silicon substrate 13 -- laser, etching, etc. -- a hole -- it is processed and the silicon oxide film 14 is formed in a front face. And a semi-conductor is formed according to a semi-conductor creation process, and a semiconductor circuit 2 is formed with the vacuum plating of aluminium and lithography.

[0013] Next, as shown in drawing 4 (b), an insulating layer 15 is formed in the table rear faces 11 and 12 of the chip substrate 1 with an imide spin coat etc., and a beer hall 5 is exposed by printing and development. And by metal vacuum evaporationo and etching, the circuit pattern 3 which connects a beer hall 5 and the connection pad 4 is formed on an insulating layer 15, and the chip substrate 1 is formed.

[0014]

[Effect of the Invention] Since a circuit pattern is connected and prepared in the table rear face of the chip substrate in which the semiconductor circuit was formed, in this invention in a beer hall, a chip substrate is accumulated on multistage with the connection pad on the rear face of a table and a semi-conductor module is formed as explained above, it becomes unnecessary, and the wiring substrate which carries out the modularization of the chip substrate makes loading area to a mother board small, and high-density mounting of it is attained.

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## \* NOTICES \*

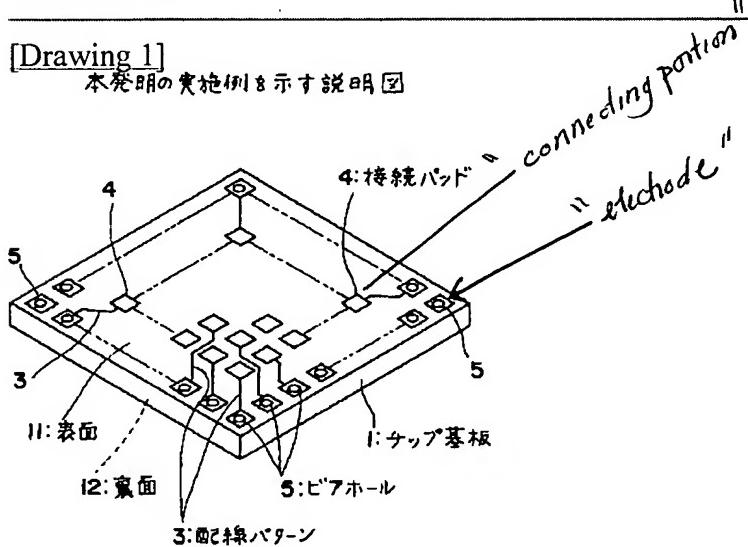
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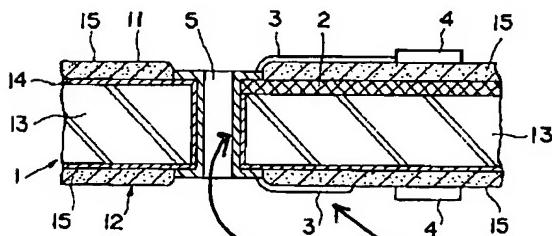
## DRAWINGS

II

[Drawing 1] 本発明の実施例を示す説明図

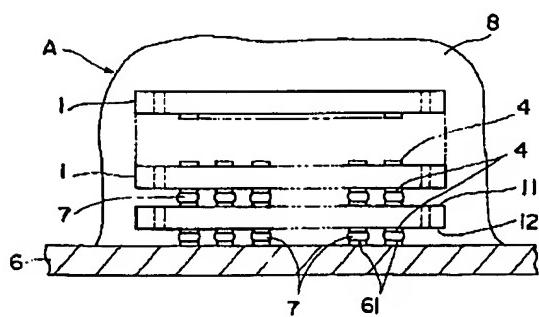


[Drawing 2] 本発明の断面を示す説明図

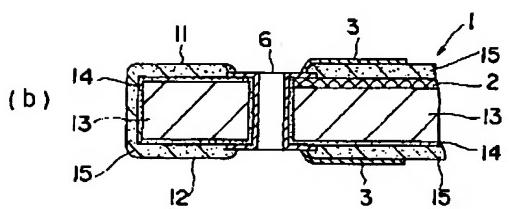
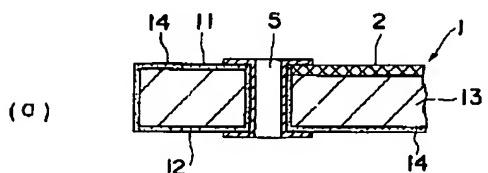


[Drawing 3] 本発明の搭載状態説明図

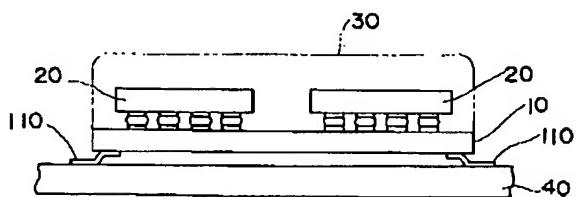
"conductive layer"



[Drawing 4]  
製造工程を示す説明図



[Drawing 5]  
従来例を示す説明図



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